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COCCOBACILLUS (FOETIDUS) OZAENAE OF PEREZ *

PLATES 1 AND 2

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The coccobacillus of Perez is of practical interest because of its supposed rôle in the ozena stage of atrophic rhinitis. It has been isolated from ozena by Horowitz, Perez, Hofer, and in this country by Horn and Ward.[1] So far the reports have not dealt extensively with the characteristic of the organism, and in this article I wish to give briefly the principal results of a study of several strains both from European sources and obtained here from patients.

Nasal exudates are inoculated in broth tubes, which are incubated for 15-20 hours, when subcultures are made on other mediums. I have found that this is a good method because the Perez bacillus practically outgrows the other organisms introduced into the broth. The following statements are based on the detailed study of 12 strains selected from 50 isolated altogether.

The bacillus is small, varies in diameter, the ratio of breadth to length being 1:1-1:4. Some of the strains assume distinctly bacillary forms on all mediums while others are often coccoid. Coccoid forms occur especially in liquid medium and in mass growths; on potato and solid mediums atypical forms are frequent. The bacillus forms no chains, no spores, is gram-negative, but otherwise stains readily. The European strains are nonmotile, and this is the case also with strains isolated here, although some appear to have become motile on cultivation, while others seemingly have been sluggishly motile from the first.

The organism is easily cultivated. Agar colonies are moist, round, translucent, bluish pale, about 2 mm. in size, the center after a few days assuming a yellow-brown tinge. On agar slants luxuriant growth develops, moist, translucent, with wavy borders, faint yellow-brown streaks appearing in older cultures, without odor. Agar stabs give a good growth, without pigmentation as a rule, the growth at the end of the puncture being slight. After 5 days at 37 C., gelatin stabs develop a uniform turbidity without liquefaction. On blood serum the growth is moist, glistening, faintly yellowish, and without odor. On potato there develops a moderate, moist, gray or faintly yellow growth, without odor. Broth becomes turbid in a few hours; in old cultures a delicate blue film forms on the surface and an unpleasant nauseating odor develops, different from that produced by B. proteus, B. coli, and the cocci. A small amount of acid is produced in litmus milk after 7 days, without clotting. Dextrin, levulose, lactose, saccharose, maltose, glycerol, inulin, and mannite are

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[1] Jour. Infect. Dis., 1916, 19, p. 153. For other references see this article.

not fermented; glucose alone is reduced, but fresh cultures may not act until 3-5 days; after 10 days the amount of gas produced may run 15-75%; the ratio of CO_2: H :: 2:3. In broth to which litmus, methylene blue, or neutral red have been added, there is complete reduction in 2-4 days.

In deep gelatin colonies pigment develops, so that after 24-72 hours the center of the colonies, by transmitted light, appears as a mahogany brown, lobulated mass within a lighter brown zone, and after 4-5 weeks at room temperature the colonies may appear as black dots on a white background. Occasionally old broth cultures develop a color so that they look like turbid claret.

The action of the bacillus on protein material is characteristic. In Dunham medium peptones are broken up and indol, skatol, ammonia, hydrogen sulphid, methylmercaptan, and other by-products are formed. The same sort of decomposition occurs also in broth, the process being only partly interfered with by carbohydrates.

Undoubtedly the odor in ozena and the odor of broth cultures of Perez' bacillus is due to volatile sulphur compounds.

In rabbits the intravenous injection of culture filtrates may cause death in 48 hours, and the injection of killed and washed bacilli may give rise to ulceration. No evidence of the formation of a true bacterial toxin has been obtained. The intravenous injection of living cultures in rabbits produces, as shown by Perez and others, increased secretion from the nose, a thin watery discharge developing, which later becomes mucopurulent. It is possible to establish in this way a chronic condition, with crusts about the nostrils. The bacillus is easily recovered from the nose, and may be recovered from the blood, spleen, and other organs. When large doses are given, death may occur within a short time; after smaller doses, death may occur after several weeks, preceded by emaciation. Some rabbits are immune.

TABLE 1

Intravenous Injections of Salt Suspensions.of Perez' Bacillus

Strains	Dose, C.c.	Nasal and General Reactions	Result
500	2.5	Marked nasal secretion	Died in 24 hours
500	2.0	Nasal crusts, emaciation	Died in 42 days
500	2.0	Nasal crusts, emaciation	Died in 32 days
500	2.0	Nasal crusts, emaciation	Died in 17 days
12.2	3.0	Moderate secretions	Died in 15 hours
12.2	2.0	Moderate secretions	Died in 5 days
12.2	1.5	Slight secretions	Recovery
12.2	1.0	Slight secretions	Recovery
23.6	2.0	Moderate secretions	Died in 57 days
23.6	1.0	Moderate secretions	Died in 3 months
23.6	1.0	Slight secretions	Recovery
23.6	0.7	Slight secretions	Recovery
11.3	3.0	Marked secretions	Died in 18 hours
11.3	2.0	Marked secretions	Died in 12 hours
11.3	2.0	Marked secretions	Died in 24 hours
11.3	1.0	Slight secretions	Recovery
29.1	2.5	Marked secretions	Recovery
29.1	2.0	Slight secretions	Recovery
29.1	1.0	Slight secretions	Recovery
29.1	.7	Marked secretions	Died in 48 hours
71.4	.7	Slight secretions	Died in 24 hours
8.2	1.0	Slight secretions	Recovery
8.3	1.0	Slight secretions	Recovery
500H	1.0	Slight secretions	Died in 4 days

After subcutaneous injections, at 3-7 day intervals of increasing quantities of Culture 500, heated for 10 minutes at 60 C., agglutinins were developed in rabbits after 1 month that clumped European and American strains in dilutions of the serum of 1:2000. All the strains mentioned in Table 1 were agglutinated by the same immune rabbit serum diluted 1:1000.

The characteristics of the bacillus of Perez may be summarized as follows: It is gram-negative, grows well in mixed broth cultures, causes a slow fermentation of glucose, decomposes proteins with the formation of mercaptan, produces a characteristic pigment in gelatin, and evokes specific agglutinins in rabbits. These characteristics are adequate to distinguish it from other bacilli, with which it may be associated, such as B. pyocyaneus, B. coli, B. mucosus, B. proteus, and B. bronchisepticus. The bacillus is readily cultivated from the exudate in ozena, with which condition it is closely associated.

EXPLANATION OF PLATES

PLATE 1

FIGS. 1, 5. European strains, 24-hour agar growths. × 1200.

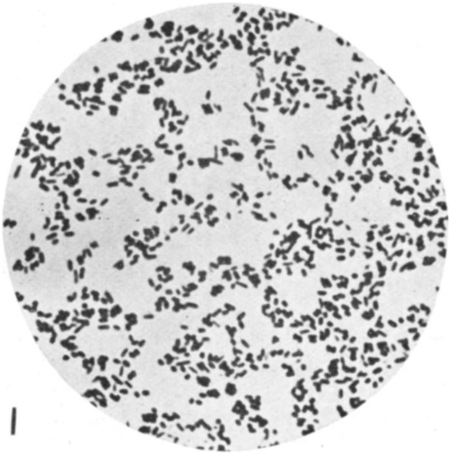
FIGS. 2, 3, 4. American strains, 24-hour agar growths. × 1200.

PLATE 2

FIG. 6. Pigment in gelatin culture after 1 month at room temperature. American strain.

FIG. 7. Pigment in gelatin culture after 1 month at room temperature. Vienna strain.

PLATE 1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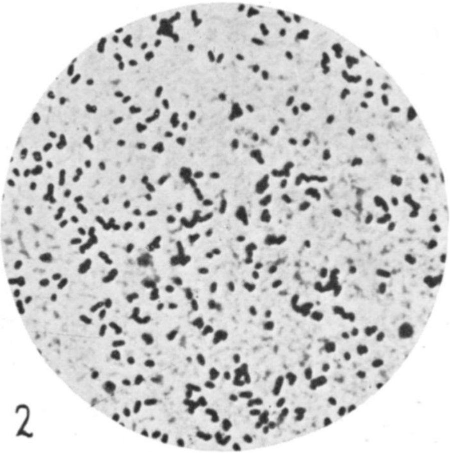
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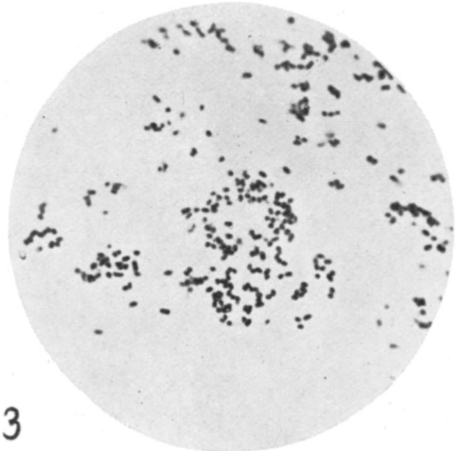
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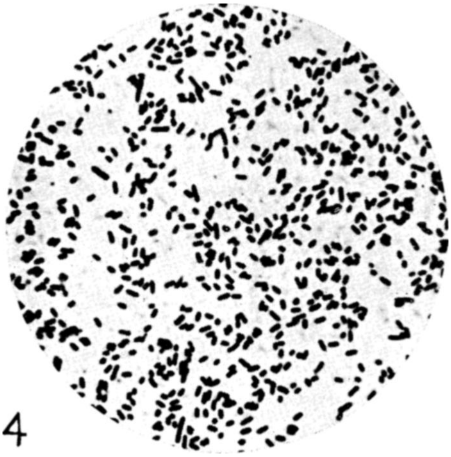
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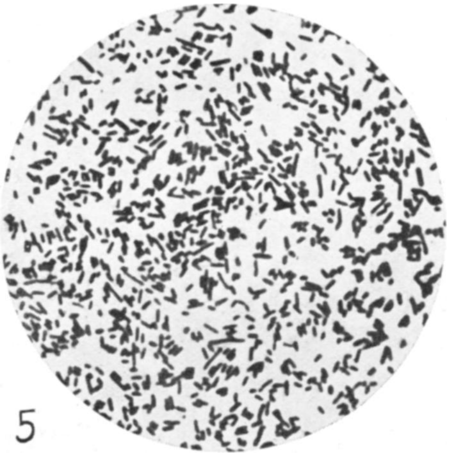
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Plate 2

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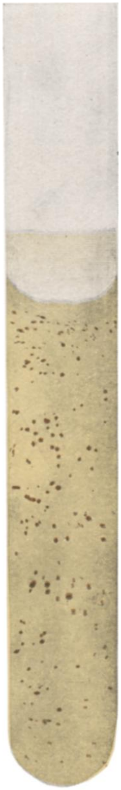

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